

POLAR BEAR(*Ursus maritimus*): Alaska

Chukchi/Bering Seas Stock

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STOCK DEFINITION AND GEOGRAPHIC RANGE

Polar bears are circumpolar in their distribution in the northern hemisphere. They occur in several largely discrete stocks or populations (Harington 1968). Polar bear movements are extensive and individual activity areas are enormous (Garner *et al.* 1990). The parameters used by Dizon *et al.* (1992) to classify stocks based on the phylogeographic approach were considered in the determination of stock separation in Alaska. Several polar bear stocks are known to be shared between countries (Amstrup *et al.* 1986, Amstrup and DeMaster 1988). Lentfer hypothesized that two Alaska stocks exist based upon: (a) variations in levels of heavy metal contaminants of organ tissues (Lentfer 1976, Lentfer and Galster 1987); (b) morphological characteristics (Manning 1971; Lentfer 1974; Wilson 1976); (c) physical oceanographic features which segregate the Chukchi Sea and Bering Sea stocks from the Beaufort Sea stock (Lentfer 1974) and; (d) movement information collected from mark and recapture studies of adult female bears (Lentfer 1974, 1983, Amstrup 1995) (Fig. 1).

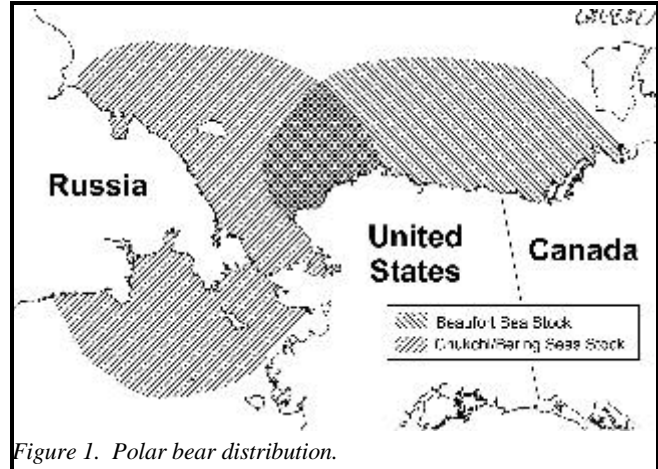


Figure 1. Polar bear distribution.

Recent studies (Garner *et al.* 1990; Amstrup 1995) have shown that the eastern bound of the Chukchi/Bering seas stock is not further than Point Barrow, and very limited movement occurs sporadically into the Beaufort Sea. The western bound of the stock is near the eastern portion of the Eastern Siberian Sea. The boundary between the Eastern Siberian Sea and the Chukchi Sea is designated on the basis of movements of adult female polar bears captured in the Bering and Chukchi seas region with specific emphasis on those female polar bears initially captured on Wrangel Island (no movement into the Eastern Siberian Sea) and those captured in the Eastern Siberian Sea (limited short term movement into the western Chukchi Sea). The Chukchi/Bering seas stock extends into the Bering Sea and its southern boundary is determined by the annual extent of pack ice (Garner *et al.* 1990). Adult female polar bears captured in the Beaufort Sea may make seasonal movements into the Chukchi Sea in an area of overlap located between Point Barrow and Point Hope, centered near Point Lay (Garner *et al.* 1990, Garner *et al.* 1994, Amstrup 1995). Telemetry data indicate that these bears, marked in the Beaufort Sea, spend about 25% of their time in the northeastern Chukchi Sea, whereas females captured in the Chukchi Sea spend only 6% of their time in the Beaufort Sea (Amstrup 1995). Activity areas of females in the Chukchi/Bering seas (mean 244,463 km², range 144,659 - 351,369 km²) were more extensive than the Beaufort Sea (mean 162,124 km², range 9,739-269,622 km²) (Garner *et al.* 1990). Radio collared adult females spent a greater proportion of their time in the Russian region than in the American region (Garner *et al.* 1990). Historically polar bears ranged as far south as St. Matthew Island (Hanna 1920) and the Pribilof Islands (Ray 1971) in the Bering Sea. Current analysis of mitochondrial DNA indicate little differentiation of the Alaska polar bear stocks (Cronin *et al.* 1991, Scribner *et al.* 1997). However, the use of microsatellites to differentiate polar bear populations in the Canadian Arctic (Paetkau *et al.* 1995) may prove to be a useful technique resolving future questions concerning stock separation and management units in Alaska.

Past management regimes have consistently distinguished between these stocks based upon the previous information. A management agreement with hunters of Alaska and the Northwest Territories, specific to the Beaufort Sea stock, has been in place since October, 1988. Similarly, a future management agreement between the U.S. and Russia governments and Native users of Alaska and Chukotka, specific to the Chukchi/Bering seas stock is currently being developed. The bounds of these stocks may be refined in the future based upon the availability of new information.

POPULATION SIZE

Polar bears occur at low densities throughout their circumpolar range (DeMaster and Stirling 1981). They are long lived, mature late, have an extended breeding interval, and have small litters (Lentfer *et al.* 1980, DeMaster and Stirling 1981). Historically polar bear population size in Alaska has been difficult to estimate because of inaccessibility of the habitat, movement of bears across international boundaries, and budget limitations (Amstrup and DeMaster 1988; Garner *et al.* 1992).

Minimum Population Estimate

A reliable population estimate for the Chukchi/Bering seas population currently does not exist. Lentfer (ALJ 1977) estimated that the Chukchi/Bering seas population stock (Wrangel Island to western Alaska) to be 7,000 and Chapman estimated the Alaska population (both stocks) at 5,550 to 5,700 (ALJ 1977). Lentfer's and Chapman's estimates (ALJ 1977), however, were not based on rigorous statistical analysis of population data and thus variance estimates could not be calculated. Amstrup *et al.* (1986) estimated densities based on mark and recapture of 266 polar bears near Cape Lisburne on the Chukchi Sea but a population estimate for the Chukchi Sea was not developed at that time. However, in 1988 Amstrup and DeMaster (1988) estimated the Alaska population (both stocks) at 3,000 to 5,000 animals based on densities calculated by Amstrup *et al.* (1986). The area for which the estimate applied and the variance associated with the estimate were not provided for the 1988 population estimate (Amstrup and DeMaster 1988). A crude population estimate for the Chukchi/Bering seas stock of 1,200 to 3,200 animals was derived by subtracting the Beaufort Sea population estimate of 1,800 animals (Amstrup 1995) from the total Alaska statewide estimate, 3,000 to 5,000, (Amstrup and DeMaster 1988). The IUCN Polar Bear Specialist Group (1997) estimated this population to be approximately 2,000 to 5,000. Other information with potential to estimate the size of this stock, such as extrapolation of denning data, have not been included due to large variation and uncertainty in the data. Since a reliable estimate for the size of this stock is unavailable, a minimum population estimate (N_{min}) has not been calculated.

Current Population Trend

Prior to the 20th century, when Alaska's polar bears were hunted primarily by Alaskan Natives, both stocks probably existed near carrying capacity (K). The size of the Beaufort Sea stock appeared to decline substantially in the late 1960's and early 1970's (Amstrup *et al.* 1986) due to excessive harvest rates when sport hunting was legal. Similar declines could reasonably have occurred in the Chukchi Sea, although there are no data with which to test this assumption. Since passage of the Marine Mammal Protection Act (MMPA) in 1972 harvest rates have declined and both stocks seem to have grown --- judging from (a) mark and recapture data, although recapture data are too sparse for the Chukchi stock to quantify its growth; (b) observations by Natives and residents of coastal Alaska and Russia; (c) catch per unit effort indices; (d) reports from Russian scientists (Uspenski and Belikov 1991); and (e) changes in the age composition of the harvest (Schliebe *et al.* 1995).

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

Default values for the maximum net productivity rates (R_{MAX}) for Alaska polar bear stocks were not established at the La Jolla PBR workshop (Wade and Angliss 1997). Population/stock specific scientific data to estimate R_{MAX} are not available for the Chukchi/Bering seas stock of polar bears. R_{MAX} for this stock may be similar to the 6.03 percent reported for the Southern Beaufort Sea polar bear stock. Taylor *et al.* (1987) estimated the sustainable yield for adult female polar bears from a hunted population to be < 1.6% per annum based upon modeling.

POTENTIAL BIOLOGICAL REMOVAL (PBR)

Under the 1994 re-authorized MMPA, the potential biological removal (PBR) level is defined as the product of the minimum population estimate, one-half the maximum theoretical net productivity rate, and a recovery factor: $PBR = (N_{min})(\frac{1}{2} R_{MAX})(F_R)$. Although a recovery factor of 1.0 is probably most accurate, the stock was assigned a recovery rate F_R of 0.5 following the guidelines of the PBR workshop (Wade and Angliss 1997) since the status of the population is unknown (Wade and Angliss 1997). The PBR level cannot be calculated for the Chukchi/Bering seas stock in the absence of a reliable estimate of minimum abundance. Increased efforts are necessary to estimate the size, harvest and life history data for this stock.

ANNUAL HUMAN CAUSED MORTALITY

Fisheries Information

Polar bear stocks in Alaska have no direct interaction with commercial fisheries activities.

Alaskan Sport and Native Subsistence Harvest

Historically, polar bears have been killed for subsistence, handicrafts and recreation. Based upon records of skins shipped from Alaska, the estimated annual harvest for 1925-53 averaged 120 bears and was primarily by Native hunters. Recreational hunting using aircraft was common from 1951-72, increasing annual harvest to 150 during 1951-60 and to 260 during 1960-72 (Amstrup *et al.* 1986; Schliebe *et al.* 1995). Aerial hunting by non-Natives has been prohibited since 1972. This reduced the mean annual harvest for both populations to 111 during 1980-96 (SD=56; range 41-297) (Schliebe *et al.* 1995) (Fig. 2).

Harvests from the Chukchi/Bering seas stock accounted for 68% (mean=75) of the annual Alaska kill during this period.

Recently, harvest levels for this stock have been declining. The 1991-1996 mean U.S. harvest was 45.2 bears and the sex ratio was 63M:37F. Seven subsistence kills, taken for defense of life or property from 1991-1996, were recorded as subsistence takes. The number of unreported kills since 1980 to the present time is thought to be negligible. In western Alaska, there is presently no government control on the number of bears taken providing the population is not depleted and the taking is not wasteful. A formal self-imposed hunter management agreement, with harvest guidelines, similar to that of the North Slope Borough and Canadian Inuvialuit Game Council management agreement has not been developed. However development of a management agreement for this stock between Native representatives of both countries and between the United States and Russian governments is ongoing. In 1997, a Cooperative Agreement was developed between the U.S. Fish and Wildlife Service and the Alaska Nanuuq Commission to implement Section 119 of the MMPA Amendments of 1994. This Agreement facilitates local participation in activities related to the conservation and management of polar bears.

Other Removals

Russia prohibited all hunting of polar bears in 1956 in response to perceived population declines caused by over-harvest. In Russia, only a small number of animals, less than 3-5 per year, were removed for placement in zoos prior to 1986 (Uspenski 1986) and a few were taken in defense of life. No bears were taken for zoos or circuses from 1993 to 1995 (Belikov 1997). The demand for zoo animals has decreased in recent years. Prior to emergence of increased illegal take in 1992, Belikov (1993) estimated that up to 10 "problem" bears were killed annually in all of the Russian Arctic. Increased illegal hunting of polar bears in the Russian Arctic was recognized in 1992, primarily in response to decentralization of management authority, entering a free market economy, and increased economic pressures. Although the magnitude of the illegal harvest in Russia from the Chukchi/Bering seas stock is unsubstantiated, estimates range from 10 to 150 bears per year.

In Alaska, 3 orphaned cubs have been placed into zoos since 1989. In Alaska an illegal harvest, if it occurs, is so small as to be undetectable. Industry has not been responsible for any lethal take of polar bears in this region.

STATUS OF STOCK

Polar bears in the Chukchi/Bering seas stock are not listed as "depleted" under the MMPA or listed as "threatened" or "endangered" under the Endangered Species Act. Although reliable estimates of the minimum population, PBR level, and human-caused mortality and serious injury are currently not available, the stock appears to have increased during the past 27 years despite a substantial annual harvest. The stock appears to be increasing slightly or stabilizing at a relatively high level, however the relationship of this population to K cannot be determined with existing information. Due to the lack of information indicating that subsistence hunting is adversely affecting this population stock and no incidental loss due to any U.S. commercial fishery, the Chukchi/Bering seas polar bear stock is classified as a non-strategic stock.

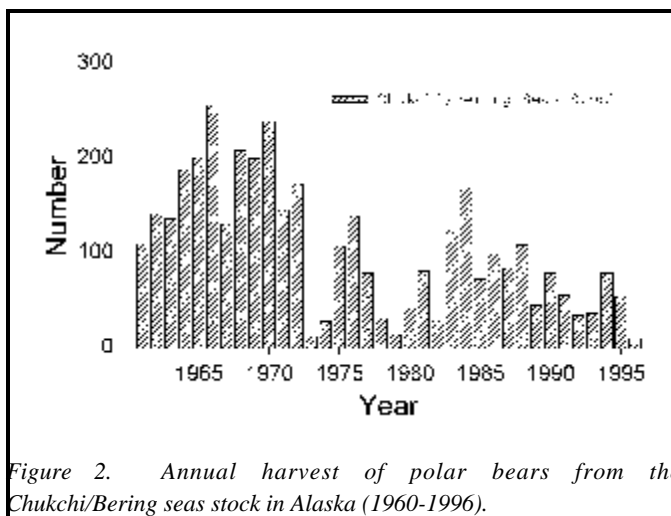


Figure 2. Annual harvest of polar bears from the Chukchi/Bering seas stock in Alaska (1960-1996).

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